

Dollery, Brian and Worthington, Andrew (1995) The Impact of Fiscal Illusion on Housing Values: An Australian Test of the Debt Illusion Hypothesis. *Public Budgeting and Finance* 15(3):pp. 63-73.

Copyright Blackwell Publishing

The Impact of Fiscal Illusion on Housing Values: An Australian Test of the Debt Illusion Hypothesis

BRIAN E. DOLLERY AND ANDREW C. WORTHINGTON

The debt illusion hypothesis holds that taxpayers may underestimate the present discounted value of future tax liabilities under debt finance. The empirical question arises as to whether debt illusion at the local government level can affect housing values. This proposition is evaluated by investigating whether local fiscal variables are fully capitalised into housing values by means of a pooled time-series, cross-sectional analysis of 27 metropolitan municipalities in Sydney, Australia, for the period 1989 to 1991. The results indicate that municipal debt is under-capitalised into housing values, and accordingly suggests that local government expenditure may be systematically biased upwards.

In its most general form fiscal illusion refers to the systematic misperception of both the benefits and costs of government activity by taxpayers, and the effects of this misperception on public expenditure in a given fiscal jurisdiction. Within this broad definition scholars have identified five specific types of fiscal illusion. The revenue-complexity hypothesis holds that taxpayers may miscalculate their tax burden due to the fragmentation of the revenue - raising system. Secondly, the degree of income elasticity of the revenue system is thought to influence the volume of public spending. A further source of fiscal illusion resides in the "flypaper" effect, where intergovernmental grants may increase government expenditure by more than an equivalent increase in income from other sources. A fourth type of fiscal illusion is renter illusion which holds that a relationship exists between the proportion of real estate renters in a given jurisdiction and the level of public expenditure *ceteris paribus*. The fifth purported cause of fiscal illusion is debt illusion which represents the focus of the present paper.

In essence, the debt illusion hypothesis postulates that leveraged fiscal systems are more costly to evaluate than comparable systems based on current taxation, and therefore engender higher levels of government expenditure. Oates has argued that this occurs because voters "...are more likely to perceive the costs of public programs if they pay for them through current taxation than if tax liabilities are deferred through public-sector borrowing".¹ The theoretical basis for this observation rests on the assumption that individual taxpayers possess highly imperfect information on the time paths of future benefits and costs of government activity. Thus "the excess of the present value of perceived future net benefits over the present value of actual net future benefits represents an illusory addition to wealth which can affect real consumption and investment decisions".² Accordingly, since a price differential can arise between the perceived tax-price of debt-based

expenditure and tax-based expenditure, reliance on debt financing will induce a larger volume of government expenditure *ceteris paribus*.

Brian E. Dollery and Andrew C. Worthington are in the Department of Economics, University of New England, Armidale NSW 2351, Australia. The authors would like to thank an anonymous referee for helpful comments on an earlier draft.

Given that fiscal illusion emerges when taxpayers underestimate the present discounted value of future tax liabilities under debt finance, the question arises as to the implications of this for markets, and especially housing markets. In general, since assets and not individuals are taxed at the local level, the empirical issue becomes one of the efficacy of community debt capitalisation into individual asset values.³ The notion of debt capitalisation provides the basis for the empirical assessment of the potential impact of debt illusion on housing values. The argument has been put forward as follows:

Consider two otherwise identical communities that undertake identical capital projects. One community, call it A, finance the project out of current revenues, while community B chooses to employ bond finance so as to spread out the payments for the project over future years. At the end of the current year, the sole differences between a 'typical resident' of A and B will be that the latter will have a future tax liability whose present discounted value equals the recent differential tax payment by the resident of A. In a world of mobile consumers, this future tax liability associated with residing in community B will become capitalised into lower property values in B...other things being equal, we should find, that if there is a debt illusion, that the future tax liabilities associated with the debt are not fully capitalised into local property values.⁴

The present paper seeks to test this hypothesis by determining whether local fiscal variables are capitalised into housing values by means of pooled time-series, cross-sectional analysis of 27 metropolitan Sydney municipalities for the period 1989 to 1991.

The paper itself is sub-divided into four main areas. The first section attempts to provide a brief synopsis of the most important previous empirical approaches to the problem. Attention then falls on the models and hypotheses employed in the present study, followed by a detailed discussion of the results of the estimation procedures. The paper ends with some brief concluding remarks.

REVIEW OF EMPIRICAL LITERATURE

For our present purposes two previous empirical studies are especially important, the details of which are outlined in Table 1 below:

TABLE 1 ABOUT HERE

Oates tested debt capitalisation in the wider context of an empirical evaluation of Tiebout mobility and local government finance.⁵ Using a sample of municipal data, Oates sought to assess "...the effects of property taxes and local expenditure programs on property values".⁶ After regressing housing values against various socio-economic determinants along with municipal tax rates and expenditures, Oates found that housing values are negatively related to tax rates and positively related to expenditures. He used the results to argue that consumers will select a community (at least in terms of housing value) by maximising net benefit, taking into account the positive effect of

higher expenditure levels and the detrimental effect of higher tax-prices. Such outcomes have persistently been verified in the numerous housing capitalisation studies that followed.⁷ However, these studies do not provide an adequate test, either directly nor indirectly, of the debt illusion hypothesis. In general, this is because they are concerned with the capitalisation of expenditure financed solely by current taxation, not with the differentials that may exist between identical communities that finance expenditure with either debt or current taxation.

In a study more closely resembling the present paper, Epple and Schipper regressed median home values against a standard set of socio-economic variables and a proxy for unfunded pension liabilities.⁸ The hypothesised value for the unfunded service requirement was unitary and negative indicating that municipal residents expected pension obligations to be funded from local taxes. If full capitalisation of the liability was found, then the presumption would be that debt illusion did not exist and the tax-price of debt funded expenditure was accurately perceived.⁹ The results did not support the hypothesis of no capitalisation. However, Epple and Schipper noted that further work was required¹⁰, whilst Inman observed that the expected differential between estimated (underestimated) and actual unfunded pension liabilities was crucial to any examination.¹¹ Subsequently, Inman reexamined the issue of pension funding, finding that the continued controversy on the correct estimation of capitalisation models, and the lack of consistent and independent measures of unfunded liabilities, was a significant reason why only Epple and Schipper had addressed this issue.¹² The present study attempts to go at least some way towards meeting this need.¹³

MODELS AND HYPOTHESES

As we have seen, if housing values do not fully capitalise debt, then the debt illusion hypothesis *per se* may hold; that is, voters in a municipality may underestimate either the contingencies associated with debt as against current taxation, or prefer "control" over the levied asset.¹⁴ A regression approach can be employed to determine the impact of debt illusion on housing values.

Table 2 outlines the models and variables utilised in testing the debt capitalisation theory. Real urban housing values in twenty-seven city municipalities over a three year period are regressed against various socio-economic and fiscal determinants of housing value using a pooled cross-sectional, time-series analysis. The models and data selected may be justified on three grounds. First, given that "...the cross-sectional units are geographical regions with arbitrarily drawn boundaries" we would not expect the assumption of cross-sectional independence to hold, and accordingly the decision to employ a cross-sectionally correlated model may be decided on *a priori* grounds.¹⁵ The error components (or random effects) formulation selected accounts for the relative size of cross-sectional observations to time-series measurements, the large number of unobservable random effects in the valuation model, and the type of inferences to be made from the present study.¹⁶ Use of this formulation gives estimates of the regression coefficients that have the same properties

as Aitken's generalised least squares estimator - errors will be uncorrelated and homoskedastic and the least squares estimator will be best linear unbiased. Second, the procedure of employing both time-series and cross-sectional pooled data is supported on the basis that "...the problem [of capitalisation] is that of comparative statics for which cross-sectional estimation is appropriate...ultimately, time-series studies of the adjustment process would provide a valuable supplement to cross-sectional studies".¹⁷ Finally, the use of urban municipal data is likewise supported by the necessity of selecting a large urban area, since it is here that the Tiebout hypothesis is most likely to hold. According to this hypothesis "...the consumer shops among different communities offering varying packages of local public services...if this is true, its (the municipality's) output of public services (as well as taxes) should influence a community's attractiveness to potential residents and should therefore affect local property values".¹⁸ The ability to "shop" for a preferred residential location is therefore most likely to hold in suburban areas, with a common central city area (ie. central business district). The model specification is a reduced form regression equation as in Epplé and Schipper.¹⁹ In line with the hypothesis of delayed capitalisation an alternative model consisting of lagged variables is also constructed.

TABLE 2 ABOUT HERE

The dependent variable selected is the real median value of representative owner-occupied housing in each municipality over the three year data sample period (VAL). The use of value, rather than price, negates the requirement for particular individual variables to account for a housing price relationship.²⁰ However, independent variables must be included in order to reflect the desirability of housing, both in general and municipality specific. In the former (IND) is a proxy for housing activity, intended to measure across the city, the general demand pressure for suburban homes.²¹ Since the index is constructed from housing activity, it would tend to show the relative desirability of housing as form of expenditure. Moreover, it would include information on mortgage interest rates, general economic conditions, demographic changes and land availability. A positive coefficient could be expected, showing suburban housing values are affected by increases in the general desirability of housing.

To account for specific municipality variances, real median income (INC) and qualitative variables for distances to the central business district, (CITY) and (SUB), are also included. If housing is defined as a normal good, then a positive coefficient should hold for the measure of INC when regressed against housing value. The distance dummies proxy the accessibility of the municipalities to the central city. Oates has observed that "since the central city is the primary source of employment in the area, individuals should, other things being equal, prefer living close to the city to minimise the cost in time and money of travelling to their place of employment (and make the leisure activities of the city more accessible)".²² Despite also using this measure, Epplé and Schipper argue that it may be unsatisfactory in a multi-employment centre city since "...property

values will be affected by accessibility to these employment centres as well as by accessibility to the central business district".²³ However, in general, the distance dummies (which cater for the two most "inner" locations) should be positive, but it may well be that middle distance suburban locations will be preferred to technically closer, but more depressed, inner city areas.

In terms of the fiscal variables, real per capita local expenditure (EXP) is examined first. Evidence suggests that "...a household considers the effective property tax rate and the level of local public services".²⁴ Since inclusion of both variables is likely to involve simultaneity, expenditure is the only measure employed. Expenditure is expected to be an imperfect proxy for the actual output of the local public good because "...we do not know of the existence of data other than expenditure that might be used to measure government services".²⁵ Despite this, "...we would expect to find that, other things being equal...an increased expenditure...should result in higher property values"²⁶ reflecting improvements in neighbourhood quality.²⁷ The second fiscal variable is per capita debt (DEBT). In general, the deferred tax obligation implied by debt should be negatively capitalised into housing values. Moreover, the extent of this capitalisation should not only be negative, but approaching unity indicating full capitalisation.

Finally, in terms of the general model formulation a log-linear form is preferred. Oates has provided the underlying argument:

The tax, expenditure and distance variables are employed in log form, which somewhat enhances their explanatory power. This would appear to make sense. As suggested by the equation...we would not expect property values to vary linearly with the absolute level of the tax rate...Similarly, we might expect that additional expenditures...would tend to yield successively diminishing increments of benefits. Finally a log form for the distance variable seems reasonable, since being an additional mile from the central city would presumably be more important to someone who was quite close to the city than to an individual who was already twenty miles away.²⁸

DISCUSSION OF RESULTS

Given the models set out above, imperfect capitalisation of debt liability into housing values would occur since debt and current taxation are viewed as imperfect substitutes.²⁹ Moreover, under these circumstances debt is preferred to current taxation, and because of a lower perceived tax-price tends to bias municipal expenditures upwards. The *ex ante* expectation is that if the regressed coefficient on debt approaches unity then full capitalisation of local liabilities has occurred, and therefore one would reject the debt illusion hypothesis.³⁰ If, on the other hand, the coefficient is less than unity, we would expect that debt is preferred to current taxation on the basis of imperfect information, and that an illusory process has occurred. However, by itself imperfect capitalisation does not imply *per se* that illusion has succeeded in biasing expenditures, only that a propensity exists for such

bias. The results presented below in Table 3 correspond to their respective *a priori* forms in Table 2, or debt capitalisation and lagged debt capitalisation in log-linear form respectively.

TABLE 3 ABOUT HERE

Model 1 details the results of pooled time-series, cross-sectional log-linear regression with median housing value as the dependent variable. The coefficients on the socio-economic variables of INC, IND, CITY and SUB are all significant and conform to the *a priori* expected signs, indicating that housing values are positively related to income, general housing conditions and proximity to the central business district. These results conform to the findings of Oates.³¹ The coefficients for the fiscal variables employed, EXP and DEBT both conform to their expected signs, though only DEBT is significant. In terms of EXP it may be that the level of expenditure in a municipality serves as a proxy for taxation, thereby supporting the notion that costs of public expenditure are much more recognisable than the benefits associated with that expenditure. Oates has noted that "...some things, such as lighting and cleaning of streets, are advantages visible to the eye...though are apt to be forgotten when the rate-collector calls".³² It is also possible that Oates' suggestion that "...increases in property tax rates unaccompanied by an expanded program of public services will depress local property values" will hold.³³ Thus, unless the benefits of higher levels of expenditures are directly associated with "housing value enhancements" (ie. roads, parks, lighting, libraries) they may serve only to highlight the extent of the tax obligation. As for DEBT, the magnitude of the coefficient is significantly smaller than unity, offering some limited support for the debt illusion hypothesis. This conflicts with the only other similar study of debt illusion, that of Epple and Schipper, who found "...the coefficients on the pension variable [unfunded liabilities as a proxy for debt]...are still much larger in magnitude than the model predicts".³⁴ They argued that the high level of capitalisation "...may result from not including the present value of unfunded liabilities that will accrue in the future, if underfunding continues".³⁵

Model 2 represents an identical set of variables and assumptions to those contained in Model 1, except that debt is lagged by one time period. All the variable's coefficients, except EXP and DEBT, are significant and correspond to the *a priori* expected signs. In terms of DEBT, the coefficient remains significantly lower than unity, indicating that debt is not fully capitalised into housing values and providing *prima facie* support for the illusionary hypothesis. Econometrically, Models 2's use of lagged debt is not preferred to the unlagged variable employed in Model 1. In general, the alternative test for debt illusion also provides tentative support for the illusionary hypothesis. In both models it would appear that municipal debt is imperfectly capitalised into housing values, indicating that current taxation and future debt are viewed as imperfect substitutes. As we argued earlier, this does not imply *per se* the fiscal illusion has succeeded in biasing expenditures, only that such a propensity exists. Moreover, Epple and Schipper have proposed that imperfect capitalisation may not even imply that fiscal illusion exists, since "...municipalities

assume that unfunded pension plans [debt] will be ultimately be bailed out by higher levels of government".³⁶ The findings therefore to some extent support Oates and Epple and Schipper in the use of the relevant variables, but conflict with Epple and Schipper's conclusion that "...our preliminary results do not support the hypothesis of no capitalisation".³⁷

CONCLUDING REMARKS

The present pooled time-series cross-sectional analysis of the effects of local government debt levels on property values represents an indirect test of the debt illusion hypothesis. The results obtained from this procedure demonstrate that municipal debt is indeed under-capitalised into housing values. Perhaps the most significant implication of this finding is that municipal debt under capitalisation provides necessary but not sufficient evidence for the presumption that debt and current taxation are not viewed as perfect substitutes, and debt may be preferred. If this is the case, then municipalities which rely on debt financing may exhibit higher levels of expenditures than similar municipalities which finance governmental activity out of current taxation. Debt illusion may thus be instrumental in biasing public expenditure upwards.

NOTES

- 1 Wallace E. Oates, "On the Nature and Measurement of Fiscal Illusion: A Survey", in *Taxation and Fiscal Federalism: Essays in Honour of Russell Matthews*, ed. Geoffrey Brennan, Bhajan S. Grewel and Peter Groenewegen (Sydney: Australian National University Press, 1988), 74.
- 2 John E. Floyd and J. Allan Hynes, "Debt Illusion and Imperfect Information". *European Economic Review* 11 (Dec. 1978), 381.
- 3 See John Yinger, "Capitalisation and the Theory of Public Finance". *Journal of Political Economy* 90 (Oct. 1982): 917-43.
- 4 Oates, "On the Nature". 76-77.
- 5 Wallace E. Oates, "The Effects of Property Taxes and Local Public Spending on Property Values: An Empirical Study of Tax Capitalisation and the Tiebout Hypothesis", in *Fiscal Federalism*, ed. Wallace E. Oates (New York: Harcourt Brace Jovanovich, 1972), 162-179.
- 6 Ibid., 163.
- 7 See Anwar M. Chaudry-Shah, "Empirical Approaches to Efficiency and Equity Issues in Local Public Finance", in *Quantity and Quality in Economic Research*, ed. R.C. Brown (Lanham: University Press of America, 1985), 39-57, for a survey of these cross section and intra-jurisdictional fiscal impacts.
- 8 Dennis Epple and Katherine Schipper, "Municipal Pension Funding: A Theory and Some Evidence". *Public Choice* 37 (1981): 141-172.
- 9 In fact the coefficient for the unfunded pension liabilities was unexpectedly large (>1). Epple and Schipper posited that failure to account for the present value of the unfunded pension liabilities that would accrue in the future if underfunding persisted which might well be the cause. That is, an initial debt increase appears to factor in higher expectations of further debt issuance which are in turn capitalised into asset values. Ibid., 151.
- 10 Ibid., 170.
- 11 Robert Inman, "Municipal Pension Funding: A Theory and Some Evidence: A Comment." *Public Choice* 37 (1981): 179-187.
- 12 Robert Inman, "Public Employee Pensions and the Local Labour Budget." *Journal of Public Economics* 19 (1982): 49-71.
- 13 Unfortunately, the Epple and Schipper study was compromised by variability in the timing of cross-sectional data and a lack of observations. It is anticipated that the panel approach adopted here will improve upon the basic model.
- 14 See, for example, James M. Buchanan, "Public Debt, Cost Theory and the Fiscal Illusion", in *Public Debt and Future Generations*, ed. J.M. Ferguson (Chapel Hill: University of North Carolina Press, 1982): 150-163.
- 15 Jan Kmenta, *Elements in Econometrics*, 2d. ed., (New York: Macmillan, 1986), 622.
- 16 Pietro Balestra, "Introduction to Linear Models for Panel data", in *The Econometrics of Panel Data: A Handbook of Theory and Applications*, ed. László Mátyás and Patrick Sevestre (Dordrecht: Kluwer, 1992), 19-29, and László Mátyás, "Error Components Models", in Ibid., 46-71.
- 17 Oates, "The Effects of Property Taxes". 175.
- 18 Ibid., 163.
- 19 Sydney (as against any other Australian state capital) municipalities were selected since information was jointly available in this time-period on both median housing values and the relevant fiscal variables (1989-1991). Information prior to 1989 could not be utilised as a significant amalgamation of some inner city municipalities occurred in 1998. The pooled cross-sectional, time-series approach was utilised due to both the lack of data of a purely cross-sectional nature and the objective of measuring lagged independent variables.
- 20 Epple and Schipper, "Municipal Pension Funding". 144.
- 21 The use of a housing index is somewhat analogous to the proxy of stock price indices in valuing the systematic or market risk of individual equity shares. Individual company (municipality) specific or unsystematic risk may then be valued with peculiar variables. The IND measure is constructed by indexing real gross private housing construction activity.
- 22 Oates, "The Effect of Property Taxes". 166.
- 23 Epple and Schipper, "Municipal Pension Funding". 150.
- 24 Yinger, "Capitalisation". 920.
- 25 Epple and Schipper, "Municipal Pension Funding". 150.
- 26 Oates, "The Effects of Property Taxes". 169.
- 27 Such an assumption is by no means unqualified. It may well be that if the benefits of the public good are underestimated then higher expenditures merely serve as a proxy for higher taxes. This may not be rectified by inclusion of taxes, values and spending since an obvious problem of simultaneity would occur. See Epple and Schipper, "Municipal Pension Funding". 145.
- 28 Oates, "The Effects of Property Taxes". 170.

- 29 See George G. Daly, "The Burden of the Debt and Future Generations in Local Finance". *Southern Economic Journal* 36, 1 (July 1969): 44-51, and James M. Buchanan and Jennifer Roback, "The Incidence and Effects of Public Debt in the Absence of Fiscal Illusion". *Public Finance Quarterly* 15 (Jan. 1987): 5-25.
- 30 See Epple and Schipper, "Municipal Pension Funding", and Oates, "On the Nature".
- 31 Oates, "The Effects of Property Taxes".
- 32 Ibid., 165.
- 33 Ibid., 175.
- 34 Epple and Schipper, "Municipal Pension Funding". 148. Epple and Schipper based their 1978 study on the city of Pittsburgh and surrounding suburban municipalities. They found that when Pittsburgh was excluded, overcapitalisation was found (coefficient significantly larger than unity), when included, virtually no capitalisation (coefficient approaching zero) occurred. These somewhat ambiguous results were summarised, somewhat confusingly, as evidence for "overcapitalisation".
- 35 Ibid., 151.
- 36 Ibid., 169.
- 37 Ibid., 170.

TABLE 1
Selected studies of property values and debt illusion

Author(s) and Sources	Data	Estimation (a)	Dependent Variable (b)	Independent Variables (c)	Major Findings
Oates	53 New Jersey municipalities Cross-sectional 1961 and 1963.	OLS (log-linear) and TSLS	Median residential home value	<i>Effective tax-rate (average 1956-60), distance to urban centre (Manhattan), median number of rooms, percentage of houses built since 1950, median family income, percentage of families with lower level income.</i>	Higher tax-rates are capitalised into housing values. Evidence also that the positive benefits of higher local expenditure are positively capitalised into values.
Epplé and Schipper	130 Pennsylvania municipalities and 57 Pittsburgh and nearby municipalities. Cross-sectional 1976	OLS (log-linear)	Median value of residential property.	<i>School expenditures per capita, effective tax rate, unfunded service cost/ market value of property, median income, travel time to CBD, proportion of homes lacking some or all plumbing facilities.</i>	Tax rates are negative and significantly capitalised into housing values. Unfunded service costs (proxy for debt) either insignificantly positive or excessively negative (greater than 1) indicating over capitalisation.

a) OLS/TSLS - Ordinary Least Squares and Two-Stage Least Squares respectively.

b) More than one dependent variable indicates alternative equations have been evaluated.

c) Italicised independent variables indicate significant t-values at 90% or more.

Source: Oates "The Effects of Property Taxes" 957-971. Epplé and Schipper, "Municipal Pension Funding" 141-172.

TABLE 2
Models and variables for property values and fiscal illusion

Method			
Pooled time-series, cross-sectional analysis of 27 Sydney municipalities 1989-1991.			
Models			
(1) $\ln VAL_{jt} = \beta_0 + \beta_1 \ln INC_{jt} + \beta_2 \ln EXP_{jt} + \beta_3 \ln DEBT_{jt} + \beta_4 \ln IND_{jt} + \beta_5 \ln CITY_{jt} + \beta_6 \ln SUB_{jt} + u_{jt}$ (2) $\ln VAL_{jt} = \beta_0 + \beta_1 \ln INC_{jt} + \beta_2 \ln EXP_{jt} + \beta_3 \ln DEBT_{jt-1} + \beta_4 \ln IND_{jt} + \beta_5 \ln CITY_{jt} + \beta_6 \ln SUB_{jt} + u_{jt}$			
Variables	Details	Data Source(s)	Expected Sign
VAL	Real median value of owner occupied housing in the j-th municipality in the t-th time period (\$).	NSW Valuer Generals Department, <i>New South Wales Real Estate Market 1989-1991</i> (Sydney, 1991).	
INC	Real median income of the j-th municipality in the t-th period (\$).	Australian Taxation Office, <i>Taxation Statistics 1989-1991</i> (Canberra: AGPS)	+
EXP	Real per capita municipal expenditure in the j-th jurisdiction in the t-th period (\$).	Australian Bureau of Statistics, <i>Local Government Finance: NSW 1989-1991</i> (Canberra: AGPS, Cat. 5502.1). NSW Dept of Local Government, <i>Comparative Information on NSW Local Government Councils 1989-1991</i> (Sydney, 1991).	+ or -
DEBT	Real per capita municipal debt in the j-th jurisdiction in the t-th period (\$).	Australian Bureau of Statistics, <i>Local Government Finance: NSW 1989-1991</i> (Canberra: AGPS, Cat. 5502.1). NSW Dept of Local Government, <i>Comparative Information on NSW Local Government Councils 1989-1991</i> (Sydney, 1991).	-
IND	Proxy for index of general housing activity	Australian Bureau of Statistics, <i>Building Activity - Australia 1989-1991</i> (Canberra, AGPS, Cat. 8752.1). Australian Bureau of Statistics, <i>House Price Indexes: Eight Capital Cities 1989-1991</i> (Canberra: AGPS, Cat. 6416.0).	+
CITY	Dummy if municipality is within 6 kilometres of CBD	NSW Valuer Generals Department, <i>New South Wales Real Estate Market 1989-1991</i> (Sydney, 1991).	+ or -
SUB	Dummy if municipality is between 6 and 25 kilometres of CBD	NSW Valuer Generals Department, <i>New South Wales Real Estate Market 1989-1991</i> (Sydney, 1991).	+ or -

TABLE 3
Results of regression estimation for property values and fiscal illusion

Variable	Model 1	Model 2
CONSTANT	3.348* (1.634)	2.877* (1.640)
INC	1.408*** (0.159)	1.442*** (0.160)
EXP	-0.182 (0.173)	-0.243 (0.173)
DEBT	-0.078* (0.046)	-0.033 (0.041)
IND	0.533** (0.205)	0.448** (0.202)
CITY	0.467*** (0.083)	0.475*** (0.084)
SUB	0.361*** (0.067)	0.380*** (0.067)
Notes: Values in parentheses are the corresponding standard errors. Asterisk(s) represent the level of significance; * - 90%, ** - 95% and *** - 99%.		

NOTES

- ¹ Wallace E. Oates, "On the Nature and Measurement of Fiscal Illusion: A Survey", in *Taxation and Fiscal Federalism: Essays in Honour of Russell Matthews*, ed. Geoffrey Brennan, Bhajan S. Grewel and Peter Groenewegen (Sydney: Australian National University Press, 1988), 74.
- ² John E. Floyd and J. Allan Hynes, "Debt Illusion and Imperfect Information". *European Economic Review* 11 (Dec. 1978), 381.
- ³ See John Yinger, "Capitalisation and the Theory of Public Finance". *Journal of Political Economy* 90 (Oct. 1982): 917-43.
- ⁴ Oates, "On the Nature". 76-77.
- ⁵ Wallace E. Oates, "The Effects of Property Taxes and Local Public Spending on Property Values: An Empirical Study of Tax Capitalisation and the Tiebout Hypothesis", in *Fiscal Federalism*, ed. Wallace E. Oates (New York: Harcourt Brace Jovanovich, 1972), 162-179.
- ⁶ Ibid., 163.
- ⁷ See Anwar M. Chaudry-Shah, "Empirical Approaches to Efficiency and Equity Issues in Local Public Finance", in *Quantity and Quality in Economic Research*, ed. R.C. Brown (Lanham: University Press of America, 1985), 39-57, for a survey of these cross section and intra-jurisdictional fiscal impacts.
- ⁸ Dennis Epple and Katherine Schipper, "Municipal Pension Funding: A Theory and Some Evidence". *Public Choice* 37 (1981): 141-172.
- ⁹ In fact the coefficient for the unfunded pension liabilities was unexpectedly large (>1). Epple and Schipper posited that failure to account for the present value of the unfunded pension liabilities that would accrue in the future if underfunding persisted which might well be the cause. That is, an initial debt increase appears to factor in higher expectations of further debt issuance which are in turn capitalised into asset values. Ibid., 151.
- ¹⁰ Ibid., 170.
- ¹¹ Robert Inman, "Municipal Pension Funding: A Theory and Some Evidence: A Comment." *Public Choice* 37 (1981): 179-187.
- ¹² Robert Inman, "Public Employee Pensions and the Local Labour Budget." *Journal of Public Economics* 19 (1982): 49-71.
- ¹³ Unfortunately, the Epple and Schipper study was compromised by variability in the timing of cross-sectional data and a lack of observations. It is anticipated that the panel approach adopted here will improve upon the basic model.
- ¹⁴ See, for example, James M. Buchanan, "Public Debt, Cost Theory and the Fiscal Illusion", in *Public Debt and Future Generations*, ed. J.M. Ferguson (Chapel Hill: University of North Carolina Press, 1982): 150-163.
- ¹⁵ Jan Kmenta, *Elements in Econometrics*, 2d. ed., (New York: Macmillan, 1986), 622.
- ¹⁶ Pietro Balestra, "Introduction to Linear Models for Panel data", in *The Econometrics of Panel Data: A Handbook of Theory and Applications*, ed. László Mátyás and Patrick Sevestre (Dordrecht: Kluwer, 1992), 19-29, and László Mátyás, "Error Components Models", in Ibid., 46-71.
- ¹⁷ Oates, "The Effects of Property Taxes". 175.
- ¹⁸ Ibid., 163.
- ¹⁹ Sydney (as against any other Australian state capital) municipalities were selected since information was jointly available in this time-period on both median housing values and the relevant fiscal variables (1989-1991). Information prior to 1989 could not be utilised as a significant amalgamation of some inner city municipalities occurred in 1998. The pooled cross-sectional, time-series approach was utilised due to both the lack of data of a purely cross-sectional nature and the objective of measuring lagged independent variables.
- ²⁰ Epple and Schipper, "Municipal Pension Funding". 144.
- ²¹ The use of a housing index is somewhat analogous to the proxy of stock price indices in valuing the systematic or market risk of individual equity shares. Individual company (municipality) specific or unsystematic risk may then be valued with peculiar variables. The IND measure is constructed by indexing real gross private housing construction activity.
- ²² Oates, "The Effect of Property Taxes". 166.
- ²³ Epple and Schipper, "Municipal Pension Funding". 150.
- ²⁴ Yinger, "Capitalisation". 920.
- ²⁵ Epple and Schipper, "Municipal Pension Funding". 150.
- ²⁶ Oates, "The Effects of Property Taxes". 169.
- ²⁷ Such an assumption is by no means unqualified. It may well be that if the benefits of the public good are underestimated then higher expenditures merely serve as a proxy for higher taxes. This may not be rectified by

inclusion of taxes, values and spending since an obvious problem of simultaneity would occur. See Epple and Schipper, "Municipal Pension Funding". 145.

²⁸ Oates, "The Effects of Property Taxes". 170.

²⁹ See George G. Daly, "The Burden of the Debt and Future Generations in Local Finance". *Southern Economic Journal* 36, 1 (July 1969): 44-51, and James M. Buchanan and Jennifer Roback, "The Incidence and Effects of Public Debt in the Absence of Fiscal Illusion". *Public Finance Quarterly* 15 (Jan. 1987): 5-25.

³⁰ See Epple and Schipper, "Municipal Pension Funding", and Oates, "On the Nature".

³¹ Oates, "The Effects of Property Taxes".

³² Ibid., 165.

³³ Ibid., 175.

³⁴ Epple and Schipper, "Municipal Pension Funding". 148. Epple and Schipper based their 1978 study on the city of Pittsburgh and surrounding suburban municipalities. They found that when Pittsburgh was excluded, overcapitalisation was found (coefficient significantly larger than unity), when included, virtually no capitalisation (coefficient approaching zero) occurred. These somewhat ambiguous results were summarised, somewhat confusingly, as evidence for "overcapitalisation".

³⁵ Ibid., 151.

³⁶ Ibid., 169.

³⁷ Ibid., 170.